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PAPERS FROM THE HOPKINS STANFORD GALAPAGOS EXPEDITION, 1898-1899.

XV.

NEW FISHES.

BY EDMUND HELLER AND ROBERT EVANS SNODGRASS.

INTRODUCTION.

THE twenty-three new species here recorded are described from the material obtained by the authors in 1898 and 1899 at the Galapagos Archipelago, Cocos Island and in the neighboring waters. The proportional measurements given are percentages of the length to the end of the vertebræ, except where otherwise stated. The writers are indebted to Dr. David Starr Jordan and to Dr. Charles Henry Gilbert, of Stanford University, for suggestions and assistance while working on the collection.

*Evolantia*, gen. nov.

*Characters*.—Pectorals about one third of total length; ventrals very short, outer lobe three and three fourths in head, a little less than four in pectoral, inner lobe two in head, insertion midway between posterior border of opercle and base of caudal; anal fin but little shorter than dorsal.

A single species known, *E. micropterus* (Cuvier & Valenciennes).

According to the disposition by Jordan & Evermann<sup>1</sup> of the flying fishes with the ventrals inserted behind the middle of the body into

<sup>1</sup> Fishes N. & M. A., III, Addenda, pp. 2835, 2836.

two genera, *Exonautes* and *Cypsilurus*, each with large ventrals, this species must be placed by itself in a third genus, for it differs from *Exonautes* and *Cypsilurus*, as thus defined, in having short ventrals and pectorals, but agrees with *Exonautes* in the length of the anal.

It is probably allied to *Exonautes* rather than to *Exocætus*, which has small ventrals, on account of the posterior position of these fins, the ventrals being anterior in *Exocætus*. *Evolantia*, hence, represents an *Exonautes* with unspecialized ventrals and with but slightly elongated pectorals.

Specimens were secured in latitude 4° N., longitude 90° W.

### SPHYRÆNA IDIASTES sp. nov.

pl. II.

*Type*. — Cat. No. 12331, Leland Stanford Jr. University Museum. Seymour Island.

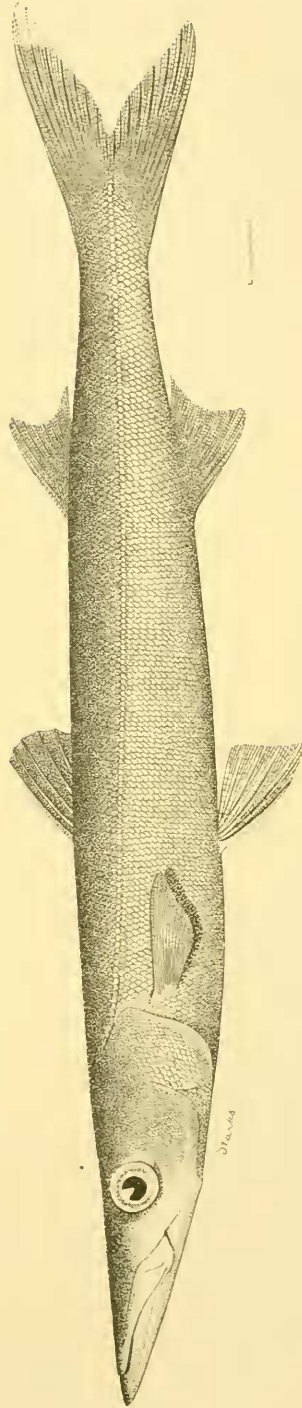
*Diagnosis*. — Differs from *S. argentea*, its closest American ally, in the posterior insertion of the ventrals, the greater length of the head, the wider interval between the maxillary and eye and in the possession of smaller scales. It is apparently most closely related to *S. helleri*<sup>1</sup> of the Hawaiian Islands from which species it differs in the scale formulæ, in the greater number of vertical rows of scales on the opercle, in the extension of the scaled area beyond the posterior border of the eye and in the longer pectorals.

*Description of the Type*. — Length 480 mm.; head 3; depth 8; eye 7; D. V, 10; A. 10; scales 20-145-12.

General shape fusiform, dorsal and ventral outlines symmetrical; head slender, acutely conical. Maxillary not reaching anterior border of orbit, separated by a space a little greater than diameter of eye; suborbital one half of head; posterior angle of opercle obtuse; exerted portion of mandible slightly greater in length than one half diameter of eye. Scales on suborbital, extending forward to below center of pupil; top of head, sides of snout and a crescent-shaped area behind and below eye naked.

Front of each jaw toothless; a series of small, flat, triangular teeth along sides of both jaws; those on mandible larger and fewer. Internal horizontal plate of each premaxillary with three large, flat, elongate teeth inclined backward; in line with each of these series are a series of six similar, large, palatine teeth directed downward and inward followed by a long series of minute teeth. Anterior portion of mandible with two large, triangular teeth directed backward.

<sup>1</sup>*Sphyræna helleri* Jenkins, Bull. U. S. Fish Comm., p. 387, 1899.



*Sphyrena idiastes*





First dorsal spine longest, four in head; posterior spines decreasing regularly in length to last which is equal to diameter of eye; spines depressible in a groove. Second ray of soft dorsal longest, exceeding slightly the first ray, three and one third in length of head; posterior rays decreasing regularly in length to ninth which is three and one half in length of first; last ray longer, two and one half in first. Caudal fin deeply forked, lobes equal. Pectorals small, about three in head, slightly exceeding the ventrals, upper rays longest. Anal similar to soft dorsal in shape but lower, first ray three and three fourths in head.

A young specimen, 50 mm. long — presumably belonging to this species — taken from the surf near Tagus Cove, Albemarle, has a series of eight wide black median dorsal spots. The first is the largest and is situated on the head posterior to the eyes, the second is fused in the median line with the third, and the last is situated on the base of the caudal peduncle. On each side is a black longitudinal line, best marked posteriorly. At the base of the anal is a large brown spot and there is a similar spot on the middle of the caudal peduncle, while at the base of the caudal fin is a smaller one. The snout and tip of the lower jaw are dusky. The rest of the body is pale. Another specimen, 40 mm. long, has the same characters except that the second dorsal spot is narrower and not fused with the third. A third specimen 97 mm. long has a faint indication of this color pattern, there being a fairly well marked granular lateral stripe and obscure traces of the dorsal spots.

MEASUREMENTS OF *Sphyræna idiaestes*.

Catalogue No. Leland Stanford Jr. University Museum.	(Type). 1233r.	1232i.
Length in mm.....	480	493
Head .....	33	33
Depth .....	13	12
Pectoral .....	11	10
Ventral.....	10	9
Depth of caudal peduncle.....	6	6
Eye: Head.....	14	14
Maxillary: Head.....	32	36
Exsertion of mandible: Head.....	8	8
Snout: Head.....	41	40
Interorbital: Head.....	15	16
Suborbital: Head.....	7	7
Dorsal Spines.....	V	V
Dorsal Rays .....	10	10
Anal Rays.....	10	10
Scales in lateral line.....	145	143
Scales, transverse .....	20-12	18-12

## APOGON ATRADORSATUS sp. nov.

pl. III.

*Type*. — Cat. No. 6357, Leland Stanford Jr. University Museum, Charles Island.

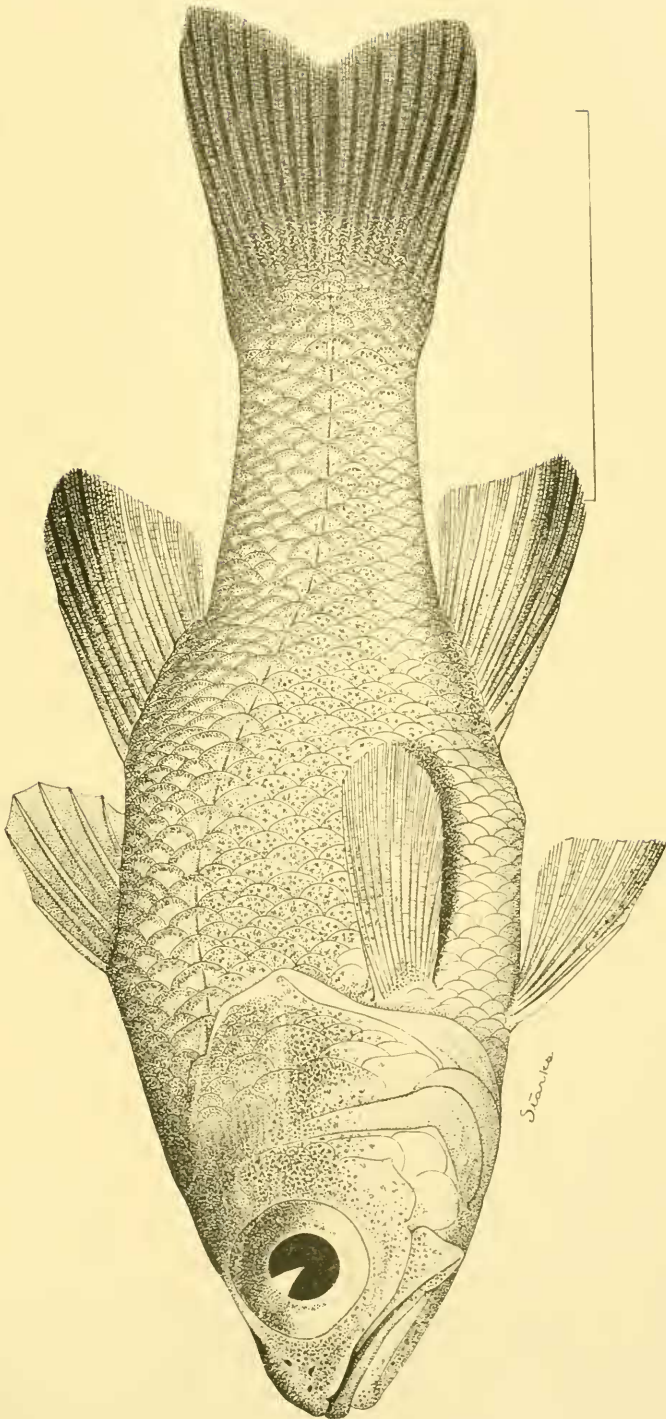
*Diagnosis*. — Almost identical with *Apogon atricaudus* of the Revillagigedo Archipelago, differing from it in having the distal half of the second dorsal black.

We have examined numerous specimens of *Apogon atricaudus* in the Stanford University collection and not one of them shows any trace of black on the second dorsal. Our specimens, preserved in the same manner as the others, invariably have the black on this fin. If the Revillagigedo specimens had in life any black on the second dorsal fin it has, in all cases, faded from it, but not from the first dorsal nor from the caudal. In many Galapagos specimens the tail appears to be a little more deeply forked than in the Revillagigedo specimens, but it is not constantly so.

*Description of the Type*. — Head two and two thirds; depth three; eye three; D. VI-I, 9; A. II, 8; scales minutely ctenoid, 3-25-11. Maxillary reaching a little back of posterior margin of pupil; pectorals reaching base of anal; ventrals reaching posterior margin of anus.

Snout blunt; profile of head straight, gently inclined from snout to front of dorsal, slightly concave from this point to front of second dorsal, descending then to base of caudal peduncle, where it forms an abrupt angle with the peduncle; ventral profile with about same convexity as dorsal, but outline from front of anal to base of caudal fin evenly and roundly concave. Second dorsal higher than first; first dorsal spine short (variable in length, in largest specimens about equal to interorbital space, in younger ones shorter); second and third spines longest, two and one half in head; succeeding spines rapidly shorter, so that posterior border of fin is receding; seventh spine attached to second dorsal, as long as second and third; second and third soft rays of dorsal longest, one half longer than last spine; posterior rays very short so that dorsal margin of fin posteriorly turns downward and forward; soft anal similar to soft dorsal; tail emarginate (the depth of emargination greater in young specimens).

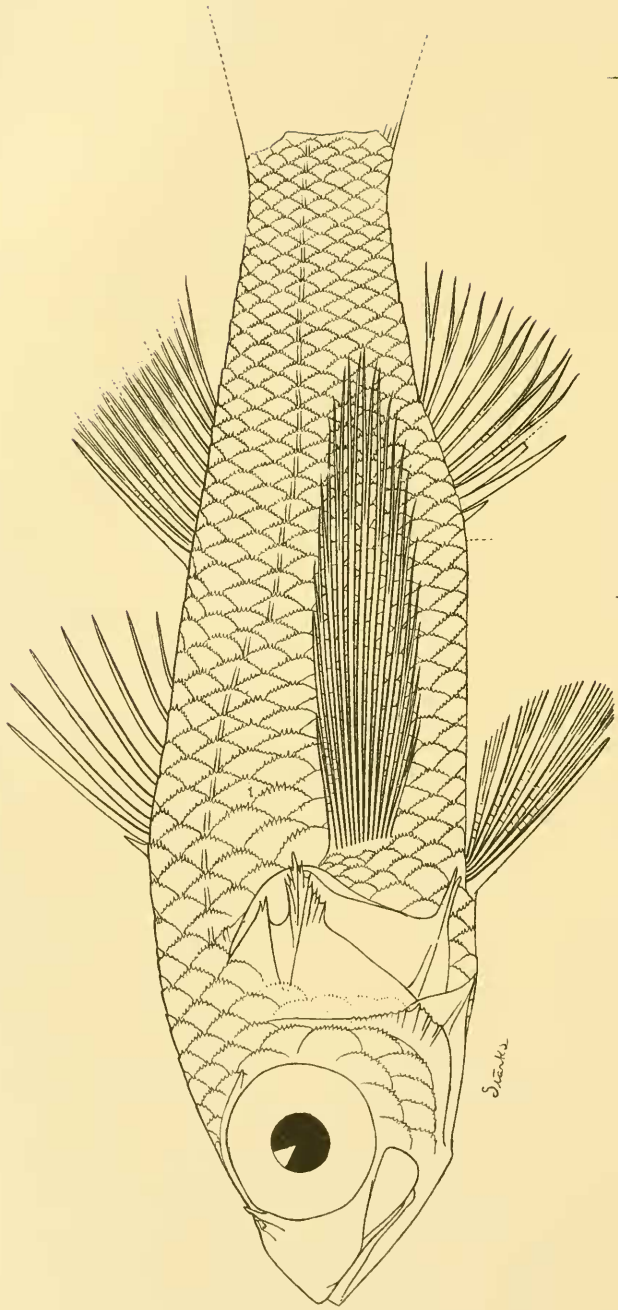
*Coloration in Alcohol*. — Brownish, darker above, minutely punctate with black specks; caudal and first dorsal dusky, second dorsal and anal pale basally, dusky terminally. In life the color was bright red, paler below, with the distal parts of the vertical fins black.



*Apogon atradorsatus*







Galeagra pammelas

The collection contains a large number of specimens of this species from Cocos Island, and from Seymour, Chatham, Narboro, Albe-marle (Tagus Cove) Tower, James, Hood, Duncan, Barrington and Charles Islands of the Galapagos Archipelago.

**Galeagra** gen. nov.

*Characters.*—Head similar in shape to that of *Apogon* but the body somewhat more elongate. Subopercle, interopercle and opercle with their angles armed with more or less prominent spines; preopercle with a double edge, the posterior edge serrated. Scales large, ctenoid, thirty three in the lateral line; lateral line little curved, interrupted; pectoral greatly elongate; dorsal fins two, the spines VIII-I; anal spines III; soft parts of both dorsal and anal short; teeth small, present in both jaws, and in a V-shaped patch on the vomer; gills four, with a slit behind the last; gill-rakers long; branchiostegals six.

Affinities somewhat doubtful. The single specimen on which the genus is based is evidently a deep-sea form.

**GALEAGRA PAMMELAS** sp. nov.

pl. iv.

*Type.*—Cat. No. 6355, Leland Stanford Jr. University Museum, Wenman Island.

*Diagnosis.*—Subopercle armed with a large spine at the angle; interopercle with a smaller spine; opercle with several small spines at angle and with a deep notch above angle; preopercle with a double edge, the anterior short, the posterior serrated; scales large, 2-33-7, serrated; lateral line not following outline of back, broken. D. VIII-I, 10; A. III, 7; maxillary short, extending to the vertical from middle of pupil; pectorals produced.

*Description of the Type.*—Head two and seven ninths in length; depth three and five sixths; eye two and two sevenths in head, maxillary two and two ninths; interorbital four and one ninth. D. VIII-I, 10; A. III, 7; scales 2-33-7, pores 33.

Body little elevated, vertical profile elliptical, with the greatest depth at front of dorsal fin; body more or less compressed; head flat above the oblique profile; snout obtusely pointed, equaling the interorbital width in length; mouth rather small, oblique, with equal jaws; maxillary short, extending to vertical from middle of pupil, lower edge smooth; both jaws armed with a single series of small teeth; a V-shaped patch of eight or nine slightly enlarged teeth on vomer; palatines apparently toothless; head spiny, with small pre- and post-



ocular spines on the supraocular margin; preopercle with a double edge, the anterior short and soon obsolete dorsally, the posterior rounded at angle, and armed with slender serrations on angle and on posterior edge; subopercle with a stout spine at angle, bifid at tip, upper spine longest, slightly more than one half the interorbital width in length; interopercle with a smaller, stouter spine at angle; opercle smooth along lower edge, the angle armed with about twelve small spines, the one at the angle considerably enlarged, a deep rounded notch above angle with two small spines above it. Gills four, a slit behind last; pseudo-branchiæ well developed. Gill-rakers long, more than one third of eye in length; fourteen below the angle. Brachio-stegal rays six.

Scales large, thirty-three in lateral line, armed with moderately long, slender serrations; head scaled on cheeks and on occiput to between orbits; entire body scaled, leaving only fin membranes naked. Lateral line begins above opercle and extends in a slight curve to between the dorsals, then goes obliquely downwards for a short distance, and then horizontally to caudal peduncle; broken between dorsals by a slight interval. (Some of the posterior scales of the lateral line are missing.)

Dorsal fins two, separated in front of last dorsal spine by an interval equal to diameter of eye. Spinous part high, rounded; third spine highest, slightly greater than one half the length of head; first spine very short; posterior spines slender. Soft dorsal joined to last dorsal spine, outline of the fin lunate, posterior rays somewhat produced and filamentous, about equaling anterior ones in length. Anal fin beginning behind origin of soft dorsal, spinous part much lower than spinous dorsal; first spine very short, second longest but evidently shorter than third, which is stouter but broken at tip. Soft anal similar to soft dorsal, but scarcely lunate. Pectoral fin long and ribbon-shaped, rays filamentous at tip, reaching beyond posterior border of anal fin; rays thirteen. Ventrals pointed, spine nearly equaling the filaments, rays I, 5. The caudal fin is missing, only a few of the basal rays remain on the ventral side.

*Coloration in Life.*—Black with metallic-green iridescence; snout and lower jaw somewhat paler; fins dusky.



MEASUREMENTS OF THE TYPE OF *Galeagra pammelas*.

Length in mm.....	58
Head.....	36
Depth.....	26
Eye.....	13
Snout.....	8
Interorbital width.....	8
Maxillary.....	14
Height of spinous dorsal.....	18
Height of spinous anal.....	11
Height of soft dorsal.....	12
Height of soft anal.....	12
Pectoral.....	42
Ventral.....	17
Depth of caudal peduncle.....	12

## CORVULA EURYMESOPS sp. nov.

*Type*. — Cat. No. 6361, Leland Stanford Jr. University Museum, Charles Island.

*Diagnosis*. — Closely allied to *Corvula macrops* Steindachner, from Mazatlan and Panama. It differs most conspicuously from this species in being much more slender; in having a greater number of dorsal spines—thirteen instead of twelve; in having the tip of the lower jaw slightly included (in *C. macrops* it reaches as far forward as the tip of the snout); in having the interorbital space wider; and in having a longer maxillary.

*Description of the Type*. — Body slender and elongate, snout blunt, lower jaw included; profile from tip of snout to nape about straight (very slightly concave), slightly rounded from here to front of spinous dorsal, straight and horizontal to front of soft dorsal, evenly descending from here to caudal peduncle. Ventral profile about same as dorsal, straight and horizontal from ventrals to anal.

Mouth oblique, at an angle of  $45^{\circ}$ . Maxillary a little greater than one half of head, about equal to second anal spine. Eye four in head. Anterior nostril oval, the posterior the larger. Angle of preopercle rounded, ascending limb inclined somewhat forward, space between its upper end and eye a little less than eye. Fifteen gill-rakers on ceratobranchial, upper ones long and slender, decreasing gradually to the lowest. Teeth all small, in a single series in lower jaw; in upper jaw a band of small teeth, the outer ones enlarged.

Fourth and fifth dorsal spines longest, about two and one half in head; first very small, almost rudimentary; second a little longer than half the length of the third; third only a little shorter than the fourth; sixth to tenth rapidly decreasing in size so that tip of tenth projects

but little back of tip of fifth in elevated fin; in closed fin fifth spine reaches beyond ninth; eleventh spine shortest; twelfth and thirteenth successively a little longer, apparently a part of the soft dorsal. Rays of soft dorsal abruptly longer than the last dorsal spines, the fourth and fifth longest, equal to the sixth spine; fin decreases slightly in height posteriorly, last ray one half of fifth. Depth of caudal peduncle a little less than one third of head; caudal fin gently rounded, middle rays two in head. First anal spines short; second slightly longer than maxillary, not specially thickened; first and second soft rays of anal longer than second spine; distal border of elevated fin perpendicular; last ray less than one half of first in length. Ventrals and pectorals same length, equal to length of head behind eye. Distance between insertion of ventrals and first anal spine one third greater than depth of body.

Entire body scaled except jaws and region between rami of lower mandible. Soft dorsal and anal with scaly sheaths along their bases. Scales on snout minute. Lateral line straight anteriorly, over tip of pectoral bent somewhat downward, from here to caudal peduncle slightly convex downward; beyond this straight, continuous to edge of caudal fin. Snout with a large slit-like pore on each side, about four very small pores above and below each of these. Three pores at symphysis of lower jaw.

*Coloration in Life.*—Above uniform dark brown, below paler silvery-brown; center of each scale on sides of body dusky-brown, forming conspicuous narrow, dark longitudinal stripes; stripes below lateral line undulatingly horizontal, wider than those above, the upper ones cut off at middle of body by deflexure of lateral line; stripes above lateral line anteriorly running backward and upward, posteriorly horizontal, extending to end of caudal peduncle; fins plain brown.

Taken at Charles and Seymour Islands.

The following table gives comparative measurements of *Corvula eurymesops*, and of one specimen of *C. macrops* in the Stanford University collection from Mazatlan.

MEASUREMENTS OF *Corvula eurymesops* AND *Corvula macrops*.

Catalogue No. Leland Stanford Jr. University Museum.	<i>Corvula eurymesops</i> .				<i>C. ma- crops</i> .
	12305.	(Type) 6361.	12306.	12307.	
Length in mm.....	156	148	137	131	161
Depth.....	31	29	27	28	35
Head.....	31	32	32	32	30
Pectoral.....	22	22	22	23	22
Ventral.....	23	23	23	23	22
Maxillary: Head.....	53	52	48	51	49
Eye: Head.....	27	26	26	28	31
Interorbital: Head.....	29	29	27	27	25
Dorsal Spines.....	XIV	XIII	XIII	XIII	XII
Second Dorsal Rays.....	24	23	24	24	25
Second Anal Rays.....	9	9	8	9	9
Scales on Lateral Line.....	46	50	46	47	48

## SCIÆNA PERISSA sp. nov.

*Type*.—Cat. No. 6360 Leland Stanford Jr. University Museum. Tagus Cove, Albemarle Island.

*Diagnosis*.—Distinguishable from any other member of the genus by the weakly serrated preopercle, enlarged anal spine and the small number of spines in the dorsal.

*Description of the Type*.—Length 183 mm.; depth two and three fifths; head about three; upper profile of body strongly convex, greatest depth at front of soft dorsal; ventral profile much less convex, evenly rounded; snout blunt, rounded; lower jaw included, symphysis nearer vertical from anterior nostril than from point midway between anterior nostril and snout. Tip of snout slightly lower than anterior nostril, strongly receding to mouth; mouth nearly horizontal; profile from snout to nape almost straight. Snout below tip with eight pores, a large slit-like pore on each side, three just above mouth, three very small ones just above these; symphysis with five pores, one small, slit-like, median one, two on each side, of which the posterior is the larger. Teeth small, in bands along sides of jaws, the outer ones, especially in upper jaw, enlarged; bands in lower jaw wide in front, tapering posteriorly; no vomerine teeth. Anterior nostril lower and smaller than posterior. Suborbital a little narrower than vertical diameter of eye. Ascending limb of preopercle very weakly serrated, inclined forward; space between its upper end and orbit equal to vertical diameter of eye. Opercle with wide membranous flap on posterior border above angle.

D. X, 33. First dorsal spine very short; second abruptly much longer; the fourth longest, two and one half in head; posterior border of fin almost vertical, last spine longer than ninth. Second dorsal fin low in front, gradually rising toward posterior end where border curves abruptly downward; the longest ray, the twenty-sixth, three in head, about equal to second dorsal spine. Anal short, II, 8; second spine two and one half in head; first and second soft rays longest, two in head, longer than fourth dorsal spine. Depth of caudal peduncle a little less than three in head. Caudal fin gently rounded, middle rays almost two in head. Upper rays of pectoral longest, one and two fifths in head.

Snout, subopercle, jaws and chin bare, rest of body covered with small ctenoid scales; small, irregularly arranged scales along lateral line.

Specimens of this species were secured at Tagus Cove and Elizabeth Bay, Albemarle Island and at Seymour Island.

*Coloration in Life.*—Above dusky-brown; belly grayish; lips flesh-color; fins dusky; iris golden-brown.

#### MEASUREMENTS OF *Sciæna perissa*.

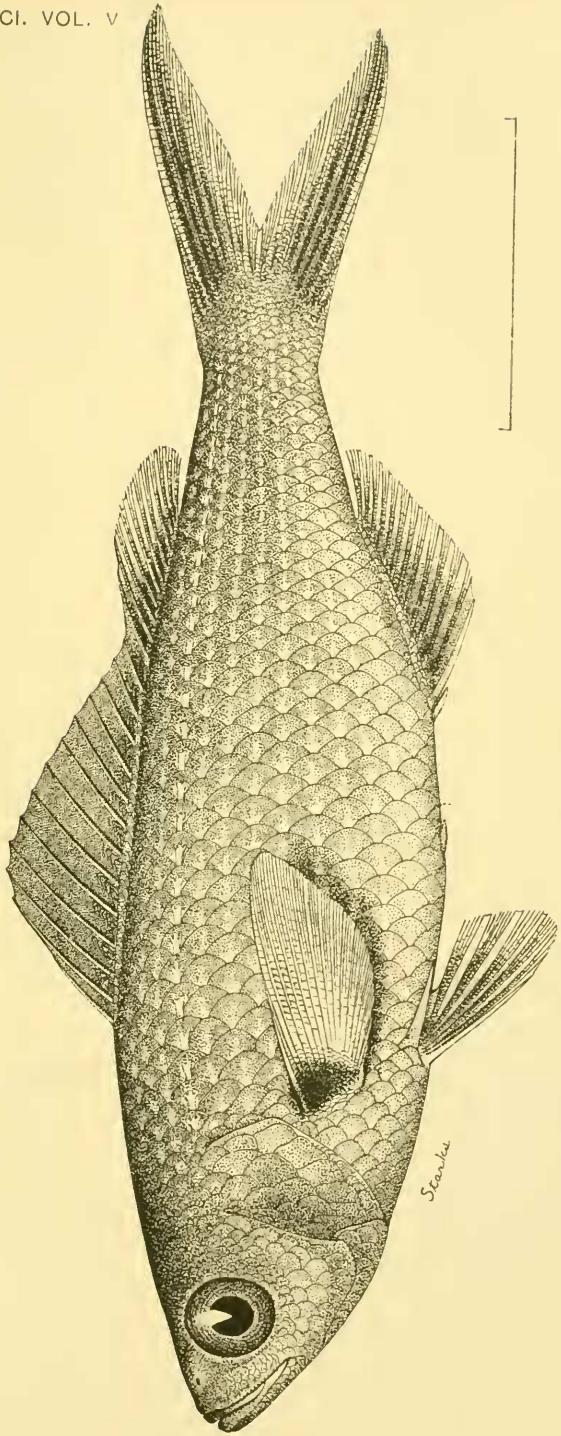
Catalogue No. Leland Stanford Jr. University Museum.	12301.		(Type) 6360.	12302.	12303.	12304.
Length in mm.....	230	187	183	178	167	147
Depth.....	39	36	39	38	38	38
Head.....	37	34	35	36	35	37
Pectoral: Head.....	67	59	62	67	65	58
Ventral: Head.....	54	58	64	59	61	55
Snout: Head.....	28	24	24	22	27	25
Eye: Head.....	20	26	24	25	23	24
Dorsal Spines.....	X	X	X	X	IX	X
Second Dorsal Rays.....	33	33	33	31	32	31
Second Anal Rays.....	7	8	8	8	8	7

#### AZURINA EUPALAMA sp. nov.

pl. v.

*Type.*—Cat. No. 6352, Leland Stanford Jr. University Museum. Hood Island.

*Diagnosis.*—Differs from *A. hirundo* in being more slender, in having the lateral line more nearly straight, the tip of the snout blunter, the interorbital space wider, the nape less elevated, the ventral profile of the body more convex, it being more convex than the upper, and in having the color olive and gray instead of blue.



*Azurina eupalama*





*Description of the Type.* — Length 92 mm., depth three and four sevenths; head three and four sevenths; pectoral four and one third; ventral five and four fifths; D. XIII, 11; A. II, 12.

Upper profile of head and body very gently and evenly curved from tip of snout to a little in front of base of caudal. Posterior end of caudal peduncle a little deeper than median part. Ventral profile of head and body also evenly curved, but more convex than the dorsal. Mouth oblique, on level with middle of caudal peduncle. Eye irregularly elliptical, longest diameter vertical. Preorbital narrow, least width about two and one half in vertical diameter of eye. Interorbital space equal to vertical diameter of eye. Upper limb of posterior margin of preopercle almost vertical, angle prominent, whole margin entire.

First dorsal spine short, considerably shorter than the others, equaling horizontal diameter of eye; third, fourth and fifth spines longest, two in head; second a little shorter than the third; spines back of fifth gradually decreasing in length; the last shorter than the first. Profile of soft dorsal rounded, median rays longest, about three fourths of longest spine. Anal longer than soft dorsal, not symmetrical with it, anterior rays longest, a little longer than second anal spine which is equal to length of longest soft dorsal ray; first anal spine very short. Caudal deeply forked, upper lobe very slightly longer than lower, outer edge of each gently convex posteriorly. Pectoral equal to greatest depth of body below lateral line, upper rays longest. Ventral one and three fourths in head, tip not prolonged into a filament.

All parts except lips, fins, and space about nostrils scaled. Scales of body large, in thirty-two oblique series. Lateral line continuous, extending entire length of body, very gently convex dorsally.

*Coloration in Alcohol.* — Brown, paler beneath, with longitudinal pale area on middle of each scale forming indistinct, pale, longitudinal stripes along the sides of body; a prominent black area on axil, covering also both sides of the base of the pectoral; caudal dusky with both margins of the lobes pale; soft dorsal and anal dusky along bases; otherwise fins plain brown like body.

*Coloration in Life.* — Above dusky olive with bluish iridescence, sides lighter dusky-gray, belly silvery, snout pure dusky; dorsal dusky, base of soft dorsal black; axil and base of pectoral black; pectorals, ventrals and anal pale; caudal pale with a dusky oblique streak through each lobe.

*Variations.* — The eight specimens secured present scarcely any departures from the characters of the *type* as described above.

Taken at Charles and Hood Islands.

MEASUREMENTS OF *Azurina eupalama*.

Catalogue No. Leland Stanford Jr. University Museum.	(Type) 6352.		12299.	12300.	
Length in mm.....	92	86	85	83	80
Depth .....	28	29	28	26	29
Head .....	28	28	29	29	30
Pectoral.....	23	23	24	22	24
Ventral.....	17	18	18	18	18
Vertical Diameter of Eye: Head.....	30	30	29	30	33
Interorbital: Head.....	33	32	30	30	33
Preorbital: Head.....	10	9	10	10	10
Dorsal Spines.....	XIII	XIII	XIII	XIII	XIII
Second Dorsal Rays.....	11	11	11	11	11
Second Anal Rays.....	12	12	12	12	12
Scale Rows .....	32	32	32	32	32

## POMACENTRUS REDEMPTUS sp. nov.

pl. vi.

*Eupomacentrus rectifranum*, JORDAN & MCGREGOR, Rep. U. S. Fish Commission, for 1898, p. 282, 1899 (Clarion and Socorro Islands).

*Eupomacentrus flavilatus*, JORDAN & MCGREGOR, Rep. U. S. Fish Commission for 1898, p. 282, 1899 (Socorro, Clarion and San Benedicto Islands).

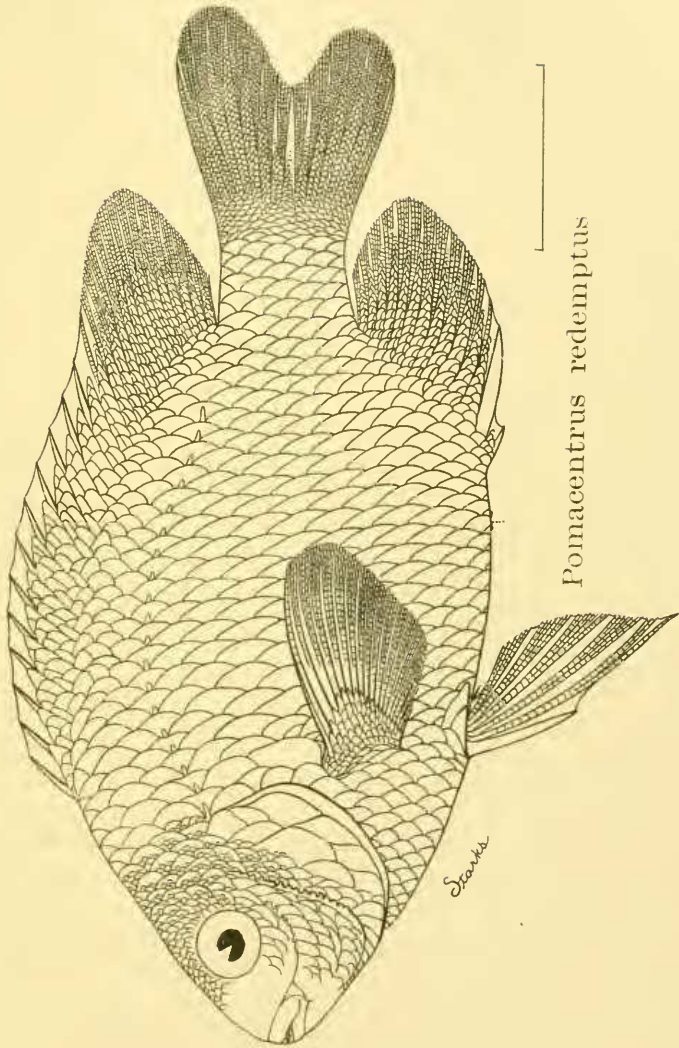
*Type*.—Cat. No. 6358, Leland Stanford Jr. University Museum. Clarion Island, Revillagigedo Archipelago. (Collector: R. C. McGregor.)

*Diagnosis*.—Forehead very evenly retreating from snout to front of dorsal; preopercle narrow, about two thirds of eye in adult; interorbital space about equal to eye; preopercle more strongly serrated than in *P. leucorus*; lips dark; young with posterior part of the body, caudal peduncle and posterior half of soft dorsal orange; color otherwise brown, with diffusion of orange posteriorly in adults.

*Description of the Type*.—Length 110 mm. Profile from snout to first dorsal straight, inclined backward at angle of about 45° with longitudinal axis of body. Dorsal spines gradually increasing in length posteriorly. Median rays of soft dorsal longest, reaching a little past base of caudal fin; last rays very short; profile of dorsal fin straight and horizontal from fourth spine to longest soft ray, so that both spines and soft rays successively more inclined backward posteriorly, the posterior longer ones being no higher than the anterior shorter ones in unelevated fin. Last soft rays horizontal. Anal similar to soft dorsal. Lobes of caudal rounded, upper lobe the larger. Upper rays of pectoral longest.

Depth two; head a little less than three; D. XII, 15; A. II, 12; eye three and four sevenths in head; least depth of preorbital one and one half in eye.





Pomacentrus redemptus



Interorbital space a little wider than diameter of eye. Suborbital gradually decreasing in width as it curves upward and backward below eye; inferior margin with irregular serrations. Upper limb of preopercle a little inclined backward from angle; serrature well developed, obsolete at angle. Several conspicuously enlarged scales on the opercle, one very large one above base of pectoral; twenty-five oblique scale rows on body. Lateral line continuous, crossing the first nineteen rows of scales, ends below middle of soft dorsal.

*Color in Alcohol.*—Brown, paler on caudal fin and peduncle; lips dark like rest of head; posterior borders of scales of body darker, forming dusky vertical stripes; a distinct black spot on upper edge of base of pectoral, not in axil.

*Variations.*—The preceding description of the type applies almost without change to the other adult specimens. In some, the upper limb of the posterior preopercular margin is inclined backward more than in the type, while in others it is less so, being in some almost vertical.

*Young Specimens.*—One immature specimen 72 mm. long has the anterior upper profile somewhat rounded, resembling in this respect *E. arcifrons*. Another 60 mm. long, however, has the profile the same as in the adults. These specimens, especially the smaller one, have the caudal peduncle, basal part of caudal fin, posterior part of body back of middle of soft dorsal, and posterior half of soft dorsal pale orange. In all ages the spot on the base of the pectoral is very distinct. In the specimen which is 60 mm. in length one scale on the back of the caudal peduncle is dusky posteriorly, forming a rather prominent mark on the prevailing yellow color.

There is no trace of spots on the scales of any of the specimens.

The species is known only from Clarion, Socorro and San Benedicto Islands of the Revillagigedo Archipelago.

MEASUREMENTS OF *Pomacentrus redemptus*.

Length in mm.....	110	107	107	106	106	72	60
Depth .....	52	52	50	52	54	50	50
Head .....	32	31	30	30	31	31	30
Pectoral.....	29	29	28	26	27	31	28
Ventral.....	29	28	31	30	30	38	37
Eye: Head.....	28	27	28	29	32	33	33
Interorbital: Head.....	28	28	33	30	29	27	28
Preorbital: Head.....	17	16	17	17	16	17	15
Dorsal Spines.....	XII	XII	XII	XII	XII	XII	XII
Second Dorsal Rays.....	15	15	15	15	15	15	15
Second Anal Rays.....	13	13	13	13	13	13	13
Scale Rows.....	25	25	25	25	25	25	25
Scales on Lateral Line.....	19	19	20	20	20	20	20

## POMACENTRUS ARCIFRONS sp. nov.

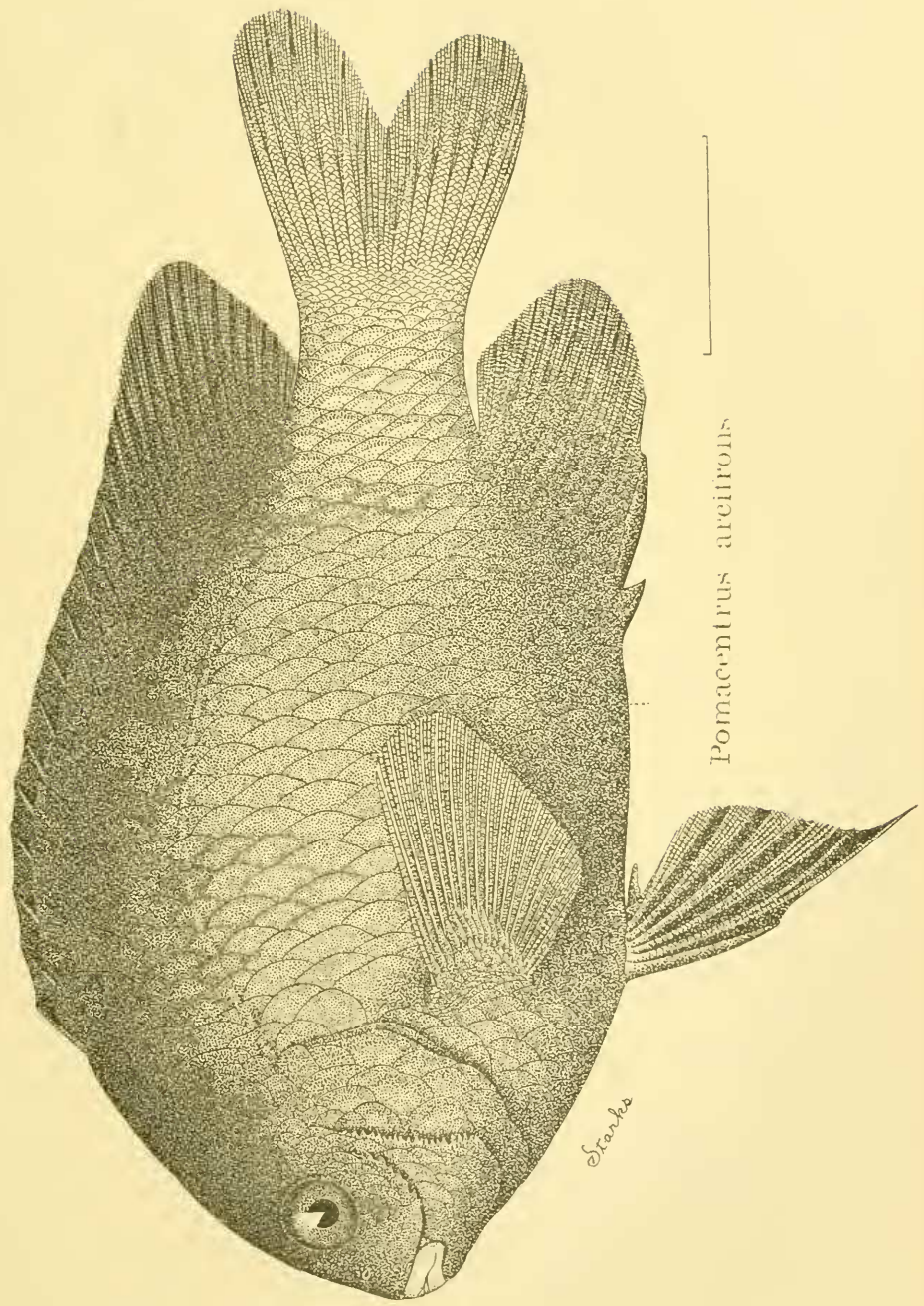
pl. VII.

*Type.* — Cat. No. 6356, Leland Stanford Jr. University Museum. Barrington Island.

*Diagnosis.* — Profile from snout to front of dorsal regularly arcuate, forehead convex; least depth of preopercle less than eye, but relatively greater than in *P. leucorus* or *P. redemptus*; interorbital space greater than eye; upper limb of opercle vertical, rather coarsely serrated; lips orange, contrasting conspicuously in color with the brown color of the head and fore part of the body; young without spots on the scales, orange posteriorly.

*Description of the Type.* — Depth of body a little more than one half its length. Profile from tip of snout to front of dorsal steep, regularly curved, thence to tip of soft dorsal, profile nearly straight. Posterior border of soft dorsal receding. Profile of body descending from front of spinous dorsal to caudal. Mouth on a level with upper edge of base of pectoral and lower edge of caudal peduncle. Ventral profile of body regularly curved. Anal fin similar in shape to soft dorsal; caudal forked, the upper lobe the larger. Head three and one third in length; eye three and two thirds in head; interorbital space about three in head; preorbital a little narrower than diameter of eye; maxillary reaching slightly back of front of eye. Posterior margin of the preopercle vertical with slender serrations. Suborbital with larger, wider, less numerous serrations. Teeth rather firmly fixed, a single row in each jaw, compressed basally, flattened antero-posteriorly at tip; D. XII, 15; A. II, 13. Dorsal spines all about the same length, the first two in head; median soft rays elongated; the last shortest; first anal spine three in second; second one and two thirds in head. Pectoral wide, fan-shaped, the upper rays longest, slightly shorter than head; outer angle of ventral prolonged into a filament, about three in length. Scales large, 5-25-10. Lateral line ending a little in front of posterior end of soft dorsal; pores on twenty scales.

*Coloration in Alcohol.* — Dark brown, with diffusion of orange over posterior parts, color varying greatly in different specimens. All have the fore parts brown and nearly all have the posterior parts orange; but the proportions of the two colors are very indefinite, some specimens being nearly all brown and others almost wholly orange.



*Pomacentrus arcifrons*

Starks





*Young specimens.* — Numerous young specimens of this species, in the collection, are easily distinguishable at all stages from the young of *Pomacentrus leucorus* by the bright yellow color of the caudal peduncle and posterior parts of the body.

I. *Specimen 51 mm. long.* — Color and outline about same as in adult. Lips pale; area on middle of soft dorsal somewhat darker than rest of fin when held to light; posterior part of caudal peduncle and tail pale yellow. Forehead steep as in adult. A specimen of about this size (59 mm. long) was colored in life as follows: above blackish-olive; belly, cheeks and chin brownish; caudal peduncle and caudal fin orange; pectoral olive; anal dark olive, purple spot at base of last ray; spinous dorsal like back, first soft rays orange-tipped, last rays of soft dorsal olive with purple spot at base; ventrals blackish, membrane brown.

II. *Specimen 37 mm. long.* — Colored same as last, except that the whole caudal peduncle is covered with orange which encroaches on hind part of body and on last rays of soft dorsal and anal.

III. *Specimen 33 mm. long.* — Yellow covers more of posterior part of body and about posterior half of soft dorsal. Dark area on fore part of soft dorsal more distinctly outlined as a round spot.

IV. *Specimen 29 mm. long.* — Same as last, except that dark spot is still more distinctly formed on soft dorsal. Specimens of this age are almost identical in shape with adult specimens of *Pomacentrus flavilatus*.

V. *Specimen 24 mm. long.* — Orange of posterior part of body very light, covering caudal peduncle, posterior part of body as far forward as middle of soft dorsal fin, posterior half of soft dorsal and last two rays of anal; large round dark spot (specimen in alcohol) very distinct on front half of basal three fourths of soft dorsal, extending also on side of back almost to lateral line; caudal fin gray; lips dark.

The characters described in the preceding paragraphs may be summarized as follows: The very young are characterized by having the anterior part of the body plain dark brown, the posterior part, including that part back of the middle of the soft dorsal fin, the posterior half of the soft dorsal, the posterior two rays of the anal, and the caudal peduncle, bright orange; contrasting strongly with the anterior dark part. They have also a large, round, dark spot (perhaps dark purple in life) on the fore-part of the soft dorsal fin and the adjoining region of the back. In this stage the lips are not colored differently from the rest of the head and the upper profile of the head is much less steep than it is later in life. As age increases, the spot on the

dorsal disappears and the lips become pale-colored, while the orange color of the posterior parts retreats backward until the individual is about 50 mm. long, when it is confined to the posterior half of the caudal peduncle. Later the orange color becomes spread indefinitely over the posterior half of the body, differing in extent in different individuals, but it generally does not cover such a distinctly defined area as in the young. Towards maturity the profile of the head becomes very steep and convex before the eyes, in some individuals almost vertical.

A large series of this species taken at the Galapagos Archipelago and at Cocos Island.

MEASUREMENTS OF *Pomacentrus arcifrons*.

Catalogue No. Leland Stanford Jr. Uni- versity Museum.	(Type) 6356.	12294.	12295.	12296.	12297.	12298.			
Length in mm.....	115	110	108	107	107	99	52	34	24
Depth .....	57	58	59	54	59	49	49	47	43
Head.....	30	29	33	30	32	31	32	32	33
Pectoral.....	29	28	28	27	29	28	30	30	27
Ventral.....	32	34	32	30	30	30	36	39	31
Eye: Head.....	27	28	27	26	28	28	33	34	34
Preorbital: Head.....	22		21	21	19	19			
Interorbital: Head.....	35	34	32	32	31	33	25	27	24
Dorsal Spines.....	XII	XII	XII	XII	XII	XII			
Second Dorsal Rays.....	15	15	15	15	15	15			
Second Anal Rays.....	13	13	13	13	13	13			
Scale Rows.....	25	24	25	24	25	25			
Scales on Lateral Line..	20		20	19	20	20			

The species of *Pomacentrus* living along the mainland of Central America is *P. rectifranum* shown in Figure 2 of Plate v. It has been reported from the Revillagigedo Archipelago, but the specimens are probably young individuals of *P. redemptus*.

**Nexilosus** gen. nov.

*Characters*.—Teeth incisor-like, entire; suborbital adnate to cheek; no scales on preorbital, scales on suborbital not well formed; fourth gill opening a very small round aperture. These are all *Hypsypops* characters except the adnate condition of the suborbital, which is a characteristic also of *Nexilarius*.

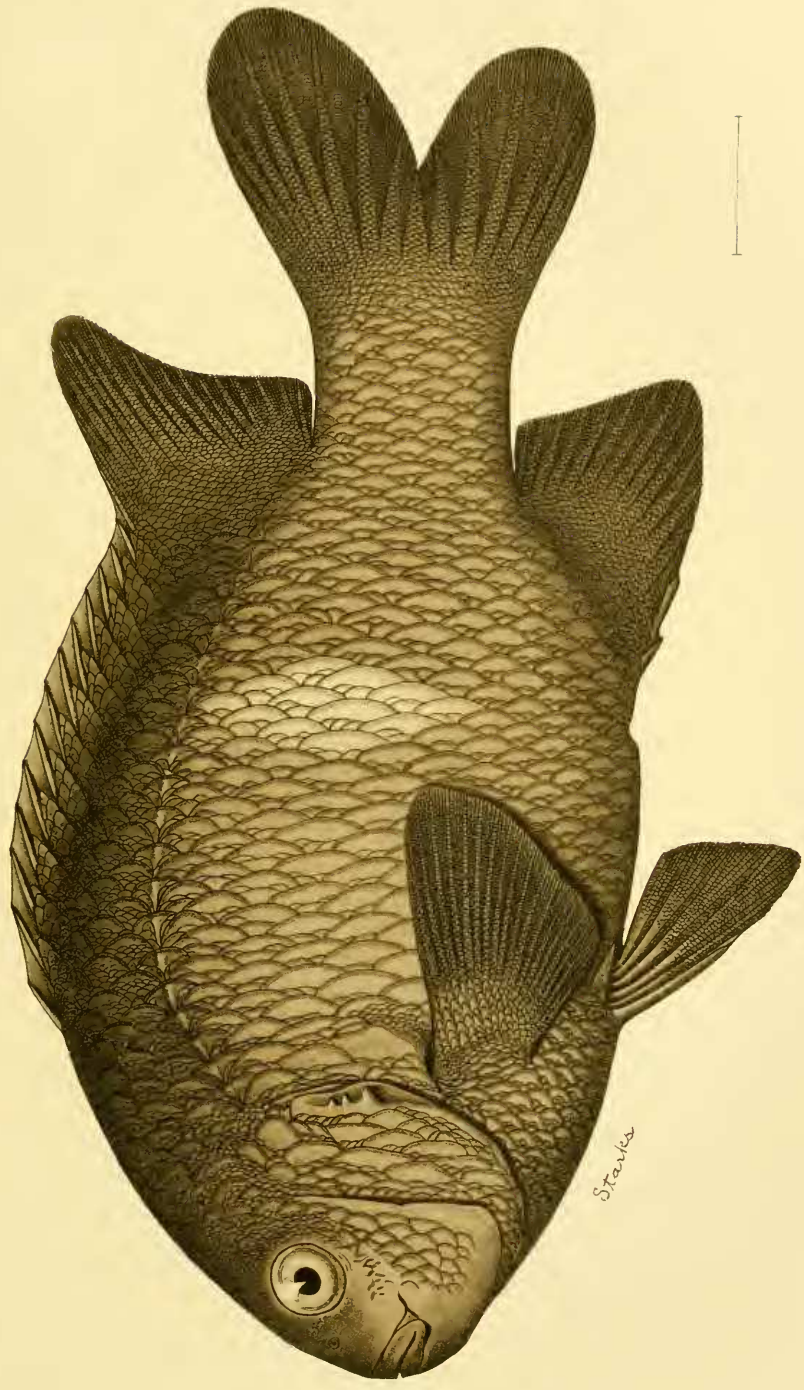
**NEXILOSUS ALBEMARLEUS** sp. nov.

pl. VIII.

*Type*.—Cat. No. 6359, Leland Stanford Jr. University Museum. Tagus Cove, Albemarle Island.

*Description of the Type*.—Length 200 mm. Body ovoid, deep, compressed; depth a little more than two in length; profile from





Nexilosus albemarleus



snout to dorsal fin arcuate, very steep; lower profile of body less convex than upper; greatest depth at middle of body. Head about three and one half in length; mouth on level with lower edge of caudal peduncle, small, curved slightly downward behind; lips thick. Teeth in a single series, laterally compressed, somewhat antero-posteriorly compressed at tips, entire. Nostril a little below eye, midway between eye and premaxilla. Eye four in head. Suborbital adnate to cheek, outline of inferior border visible; posterior limb of preopercle vertical; angle of opercle with a small flat spine; two smaller ones in a crescentic notch on posterior border above angle.

D. XIII, 17; A. II, 13. Dorsal spines all low, of uniform height, except first and second which are shorter than the others; soft dorsal abruptly higher than the spinous dorsal; anterior rays highest, almost as long as head; posterior rays rapidly decreasing to last which is lower than last dorsal spine; distal border of fin vertical, a little concave. Second anal spine the longer, equal to last dorsal spine. Middle rays of anal longest, about four fifths of longest dorsal ray; posterior rays somewhat longer than posterior dorsal rays, but base of fin ends a little in advance of base of dorsal so that the posterior borders of fins are about opposite. Depth of caudal peduncle one and one half in head, dorsal and ventral outlines straight; caudal fin deeply divided into two rounded lobes, the upper considerably the larger. Pectorals one and one sixth in head, fan-shaped, but upper rays longest. Ventral simple, rays not produced, one and one fifth in head.

Scales 4-28-12, those along middle of sides largest, most of them with small accessory scales at their bases, these most numerous above lateral line. Entire body scaled except circum-oral region as far back as eyes; scales on suborbital not well formed. Fins all densely scaly; spinous part of dorsal with scaly sheath almost concealing the spines. Lateral line on twenty-two scales, ending below posterior part of soft dorsal.

*Coloration in Life*—Sides bluish-brown, back with scales hazel in center, dark brown peripherally; a broad light-rusty vertical bar on sides above anus, tapering above and below, snout light brownish-red; fins dusky; lips dusky-bluish; belly and sides of head light brown; iris blue.

The different specimens present but little variation. The crescent-shaped notch which is present in all specimens on the posterior border of the opercle above the spine is covered with membrane. Some specimens have two small spines in the notch, as in the *type*, while in

others these are lacking. The second dorsal is proportionally lower in specimens smaller than the *type*.

*Young* (40–62 mm. long).—General shape same as that of adults. Teeth entire; preorbital and suborbital scaleless; preorbital a little less in depth than in adults (in adults almost equal to eye, five in head), in young two in eye, seven in head, but eye much larger in young, three in head (in adults four and one fourth in head). Color, above black with bluish iridescence; head and base of anal and dorsal with bright blue spots.

This species was taken at Tagus and Iguana Coves and Elizabeth Bay, Albemarle Island.

MEASUREMENTS OF *Nexilosus albemarleus*.

Catalogue No. Leland Stanford Jr. University Museum.	(Type) 6359.	12290.	12291.	12292.	12233.
Length in mm.....	200	193	193	170	166
Depth.....	54	52	55	52	57
Head.....	29	28	30	29	30
Eye: Head.....	24	24	24	23	23
Longest Dorsal Ray: Head.....	84	79	75	70	80
Longest Anal Ray: Head.....	63	60	63	60	63
Pectoral: Head.....	92	89	90	82	90
Ventral: Head.....	84	85	86	77	85
Dorsal Spines.....	XIII	XIII	XIII	XIII	XIII
Second Dorsal Rays.....	17	18	18	18	18
Second Anal Rays.....	13	15	13	14	14
Scale Rows.....	28	28	28	28	27

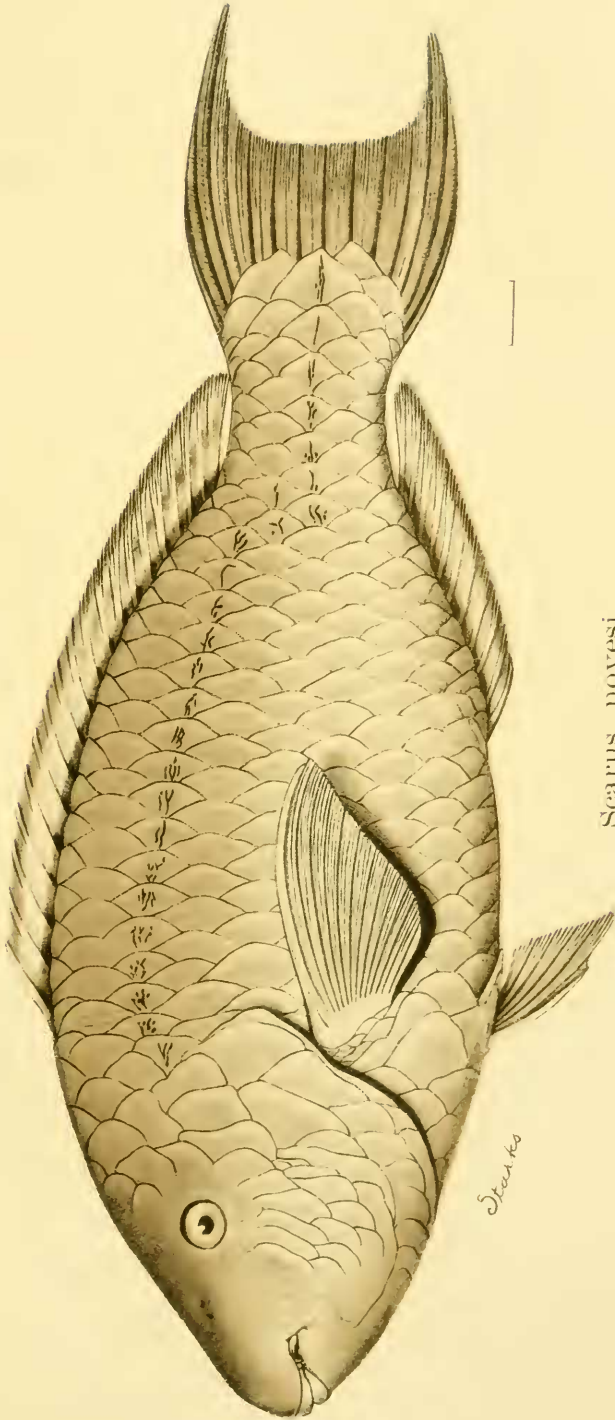
SCARUS NOYESI sp. nov.

pl. 1x.

*Type*.—Cat. No. 12332, Leland Stanford Jr. University Museum. Tagus Cove, Albemarle Island.

*Description of the Type*.—Length 428 mm. Depth two and one half; head two and two thirds; D. IX, 10; A. III, 9.

Dorsal and ventral outlines evenly rounded, the dorsal a little more convex than the ventral. Snout blunt, thick, rounded symmetrically with lower jaw; profile before eye very slightly concave. Upper lip leaving marginal space of jaw exposed for about one third the width of eye; lower jaw with a somewhat wider exposed space; margin of upper lip horizontal, of lower oblique, forming an angle of 30° with margin of upper. Dental plates white, upper with two small, conical, outwardly directed posterior canines at angle of lips. Nostrils very small, anterior circular, posterior a longitudinal slit. Eye, eight in head. Six vertical rows of scales on cheek below eye; first, second and fourth of two scales each; third of three scales, fifth of four scales



*Scarus noyesi*

*Starks*





and sixth of two scales placed high so that the upper overlaps the lower anterior scale of scaly area behind eye; opercles with large scales. Snout, lower jaw, top of head before eyes and circum-ocular region naked. Dorsal fin begins at vertical from base of pectoral, of uniform height throughout except posterior end which is a little elevated. Caudal peduncle deep, outlines concave, depth two and two fifths in head; upper and lower outlines of caudal fin convex, angles produced, median posterior margin straight; middle rays two in head, upper rays two thirds longer, lower about one half longer than median rays, upper and lower rays thickened. Anal similar to soft dorsal, highest posteriorly; spines three, the first very small, hidden beneath the skin close to the second. Second and third of equal size, same length as anterior soft rays of anal; pectoral of fourteen rays, the upper the longest, one and one third in head. Ventrals simple, short, two in head.

Scales large, twenty-two oblique series along lateral line. Lateral line beginning on fourth scale from ridge of back, and running backward over sixteen scales of third row below dorsal fin, then interrupted, beginning again on second scale below in same oblique series, and running backward over five more scales on middle of side of caudal peduncle.

*Coloration in Alcohol.* — Plain green, dorsal and anal with green base and margin, yellow mesially; dorsal with a small, median series of dark spots posteriorly.

*Coloration in Life.* — Above light brownish-gray, with bluish-green iridescence, pinkish below, brightest on throat, chin and lips; dorsal with light blue-green margin and base; pectorals light yellow, first ray blue; ventrals pinkish; anal pinkish-brown with light-blue spots; caudal light brownish like body with first upper and first lower rays blue-green; blue spot above eye; snout dark olive above; iris golden.

Another specimen was light olive-brown above, greenish on sides with pink margined scales.

*Variations.* — The number of scales in the different rows on the cheek varies somewhat, but there are always six in the arc formed beneath the eye by the uppermost scales of each vertical series. The smaller specimens have the angles of the caudal less produced than the larger ones such as the *type*. The tubes of the lateral line are irregularly branched on each scale. The two parts of the lateral line generally overlap on one scale row only, but occasionally on two.

Our specimens are from Albemarle, Narboro, Duncan and Seymour Islands.

Named for Captain Wm. P. Noyes, the sailing master of the expedition.

MEASUREMENTS OF *Scarus noyesi*.

Catalogue No. Leland Stanford Jr. University Museum.	12273.	12274.	12275.	12276.	12277.	(Type) 12332.	12278.
Length in mm.....	300	342	357	365	380	428	455
Head .....	28	31	28	31	31	34	32
Depth .....	36	37	37	38	37	39	38
Pectoral: Head .....	70	71	82	76	78	78	83
Ventral: Head.....	64	52	65	54	55	50	53
Eye: Head.....	15	14	16	14	14	13	13
Dorsal Spines.....	IX	IX	IX	VIII	VIII	IX	IX
Second Dorsal Rays.....	10	10	10	10	11	10	10
Second Anal Rays.....	9	9	9	9	9	9	9
Scale Rows .....	24	23	23	23	23	24	23

PONTINUS STRIGATUS sp. nov.

*Type*. — Cat. No. 6343, Leland Stanford Jr. University Museum. Wenman Island.

*Diagnosis*. — Snout and maxillary scaled; tentacles short or wanting on head; preopercle with four spines, upper with a supplemental spine at base, humeral spine single; last dorsal spine much longer than the eleventh; pectoral rays eighteen, extending past beginning of anal; lateral line with twenty-four pores; head two and five eighths; eye three and one sixth. Color bright red, streaked and spotted with olive-brown.

*Description of the Type*. — Head two and five eighths in length; depth three and one fourth; eye three and one sixth in head; interorbital nine and one half; maxillary two; snout three and one sixth. D. XII, 10; A. III, 5; P. 18.

Eye large, three and one sixth times in length of head. Snout short, equaling diameter of eye in length; interorbital region deeply concave, narrow, width three times in eye; occipital flat, bordered by low spines; nape rising obliquely from occiput. Paired nasal, preocular, supraocular, postocular, tympanic and parietal spines present; nape with two pairs of nuchal spines; humeral and paroccipital spines single; suborbital carina with three spines; preopercle border armed with four spines below angle, the first largest and with a supplemental spine at its base, the third spine larger than second; opercle with two broad flat spines, one situated at the angle. Head with short filaments at the bases of some of the spines, other filaments wanting. Maxillary extending to the vertical from middle of pupil, length one



half of head. Gill-rakers free, short, length at angle one third the eye.

Lateral line beginning at humeral spine and extending horizontally to the tail; pores twenty-four. Scales small, finely ctenoid; covering the body, snout posteriorly, the occiput, cheeks, opercles and maxillary; fin membranes, tip of snout, interorbital, premaxillary and lower jaw naked.

Spinous dorsal high, third spine highest, equaling one half head; eleventh spine much shorter than the twelfth; first spine shorter still. Soft dorsal lower, rounded, height three and one fourth in head. Anal fin high, second spine much larger and heavier than third, its height slightly less than one half the head. Soft anal higher than the spinous, rays more or less free at tip. Ventrals long and pointed, extending to first anal spine. Pectorals broad and fan-shaped, median rays longest, reaching third anal spine.

*Coloration in Life.*— Above bright red, the belly lighter, pinkish, dorsum and head above the level of the preopercular spine spotted or indistinctly streaked with dark olive-brown, spotted heaviest about the base of the dorsal fin; sides below the dorsal fin streaked obliquely with olive-brown; fins, spines and rays red, the membranes whitish, yellowish in the dorsal; the soft dorsal and caudal fins spotted with olive-brown; upper half of pectorals olive spotted; the soft anal with a dusky central streak.

In general form and coloration this species approaches *P. sierra* Gilbert, from the Gulf of California, but differs in the scaled maxillary, the higher and differently proportioned spinous dorsal and in the greater number and streaked character of the dark markings.

The *type* was taken from the stomach of a shark (*Carcharhinus platyrhynchus*) near Wenman Island.

MEASUREMENTS OF THE TYPE OF *Pontinus strigatus*.

Catalogue No. 6343 Leland Stanford Jr. University Museum.	
Length in mm.....	75
Head.....	38
Depth.....	31
Eye.....	12
Interorbital Width.....	4
Maxillary.....	19
Snout.....	12
Height of Spinous Dorsal.....	19
Height of Spinous Anal.....	20
Pectoral.....	30
Ventral.....	26
Depth of Caudal Peduncle.....	10

## ELEOTRIS TUBULARIS sp. nov.

pl. x.

*Type.*—Cat. No. 6348, Leland Stanford Jr. University Museum. Cocos Island.

*Diagnosis.*—Scales 46, 16; eye greater than interorbital width; anterior nostril tubes extending beyond mouth; maxillary reaching to below middle of eye. Head long, two and sixth sevenths in length.

*Description of the Type.*—Head two and sixth sevenths in length; depth four and three fourths; width of head four and one sixth; eye four and one half in head; maxillary two and three fifths; interorbital five; D. VI-I, 8; A. I, 8; scales 46, 16.

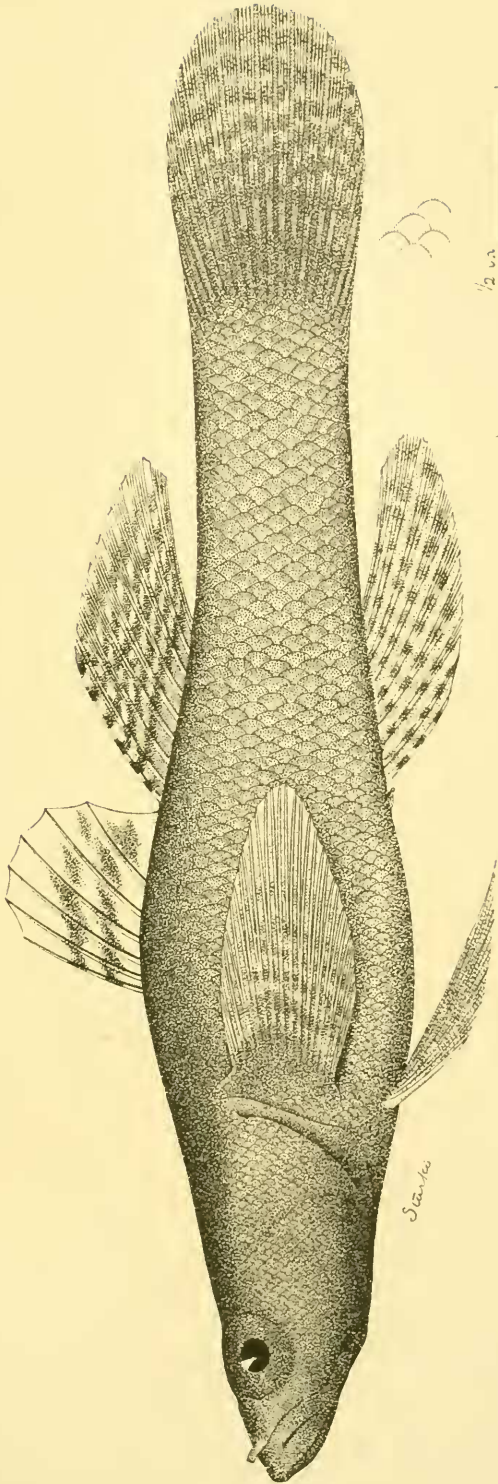
Body short and compressed posteriorly. Dorsal profile low, highest at the beginning of the dorsal fin, descending obliquely to tip of snout. Head broad and depressed; interorbital region flat or slightly concave; mouth large, oblique, with lower jaw projecting. Teeth in both jaws small and subequal. Maxillary long, extending to vertical from middle of pupil. Anterior nostril with long tubes extending considerably beyond the snout. Preopercular spine blunt, concealed and turned forward.

Scales large, ctenoid, forty-six in a line from angle of opercle to end of vertebræ; sixteen longitudinal series between dorsal fin and ventrals.

Dorsal fins separated by a slight interspace, spinous portion rounded and slightly lower than soft portion; soft dorsal attached to seventh spine, angular in outline, all the rays being of nearly equal length. Anal fin similar to soft dorsal but more rounded, beginning posterior to origin of soft dorsal. Caudal fin long, three and one fourth in length, rounded. Pectorals obtusely pointed, reaching beyond origin of anal fin, rays sixteen. Ventrals pointed, inner rays longest, separated by an interval slightly more than one half the eye.

*Coloration in Alcohol.*—Above olive-brown, darkest on the head and snout; belly lighter brownish; dorsal, anal and caudal fins closely barred with dusky; pectoral and ventral fins lighter, with less conspicuous dusky bars.

The nearest American ally of this species is *E. amblyopsis* of Surinam from which it differs chiefly in the much larger eye and longer head.



Eleotris tubularis



